

## **IN THE DRAWINGS:**

The attached sheets of drawings include changes to Figure 1, Figure 7, Figure 8, and Figure 9B. These sheets, which include Figure 1, Figure 7, Figure 8, and Figure 9B, replace the original sheets including Figure 1, Figure 7, Figure 8, and Figure 9B. In Figure 1, previously omitted reference number 232 has been added. In Figure 7, elements erroneously labeled 264 and 234 have been correctly labeled as 864 and 834, respectively. In Figure 8, reference number 960 has been amended to designate the proper element. In Figure 9B, a duplicate inclusion of reference number 264 has been deleted.

**Attachment: Replacement Sheets**  
**Annotated Sheets Showing Changes**

## REMARKS

This is intended as a full and complete response to the Final Office Action dated April 23, 2004, having a shortened statutory period for response set to expire on July 23, 2004. Please reconsider the claims pending in the application for reasons discussed below.

In the specification, paragraphs [0005], [0027], [0028], [0029], [0031], [0032], [0033], [0034], [0035], [0037], [0038], [0039], [0040], [0041], [0042], [0043], [0045], [0046], [0047], [0048], [0049], [0050], [0051], [0054], [0055], [0059], [0060], [0061], [0062], [0063], [0068], and [0070] have been amended to correct minor editorial problems. Applicants submit that no new matter has been added.

In the drawings, Figures 1, 7, 8, and 9B have been amended. In amended Figure 1, the previously omitted element numeral 232 has been added. In amended Figure 7, elements erroneously labeled 264 and 234 have been correctly labeled as 864 and 834, respectively. In amended Figure 8, reference number 960 now designates the proper element. In Figure 9B, a duplicate inclusion of reference number 264 has been deleted. Applicants submit that no new matter has been added.

Claims 1-14, 16-27, 29-42, 44-51, 53-74, 106-129 remain pending in the application and are shown above. Claims 1-14, 16-27, 29, 34, 41, 42, 44, 45, 49-51, 53-74 and 106-129 stand rejected and claims 30-33, 35-40, and 46-48 stand objected to by the Examiner as being depending from a rejected base claim, but are indicated as allowable if rewritten in independent form. Reconsideration of the rejected and objected to claims is requested for reasons presented below.

Claims 12, 16, 24, 49, 111, and 123 have been amended to correct errors in form. Claim 34 has been amended to clarify the invention. Claims 35-40 have been amended to recite proper antecedent basis in base claim 34 from which they depend. These amendments are not presented to distinguish a reference, thus, the claims as amended are entitled to a full range of equivalents if not previously amended to distinguish a reference.

Claim 34 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of

Applicants' invention. Specifically, the Examiner states the claim term "small" is a relative term, the specification does not provide a standard for ascertaining the term, and one skilled in the art would not be reasonably apprised of the scope of the invention.

Applicants respectfully traverse the rejection. Applicants have amended claim 34 to more clearly recite the invention. The claim term "small" has been deleted. The basis for this rejection has thus been obviated, as have the bases for the objections to claims 35-40. Therefore, Applicants respectfully request the rejection of claim 34 and the objection to claims 35-40 be withdrawn.

Claims 1, 3-5, 9, 11-14, 16-19, and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,179,920 to *Tarutani, et al.* in view of U.S. Patent No. 6,334,983 to *Okayama, et al.* The Examiner asserts that *Tarutani, et al.* teach each element of Applicants' claimed invention except for a chamber lid having a tapered bottom surface. The Examiner asserts that *Okayama, et al.* teach tapering a surface adjacent to a processing chamber, and it would have been obvious to one skilled in the art to combine the teachings of *Okayama, et al.* with the chamber disclosed by *Tarutani, et al.* to achieve Applicants' invention.

Applicants respectfully traverse the rejection. While *Tarutani, et al.* teach a covering member containing an expanding channel, *Okayama, et al.* do not teach tapering a surface of a process chamber. Specifically, the "tapered surface" described by *Okayama, et al.* is merely an additional example of an expanding channel. The through hole 144d of insulating member 144 is described by *Okayama, et al.* wherein "[a]n end part of the through hole 144d opening in the expanded part 144b is substantially tapered so as to expand toward its open end." (Column 9, Lines 26-28) This shows that the tapering is contained within the through hole 144d and merely defines an expanded section of through hole 144d. This tapering does not encompass a bottom surface of a covering member, as is required in Applicants' base claim 1.

Furthermore, the surface asserted by the Examiner as being tapered does not extend to a peripheral portion of the covering member, as recited in Applicants' claim 1. The through hole 144d of *Okayama, et al.* cited by the Examiner (Column 3, Line 66 to Column 4, Line 10) is one of a plurality of such elements disposed within the periphery

of the top wall 104a of the processing vessel 104. (Figure 1) Importantly, as held in *In re Royka*, 490 F.2d 981 (CCPA 1974), to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (MPEP § 2143.03) Therefore, the cited references, alone or in combination, do not teach, show, or suggest a covering member for a chamber comprising a tapered bottom surface extending from the expanding channel to a peripheral portion of the covering member, as recited in base claim 1, and claims depending therefrom. Withdrawal of the rejection is respectfully requested.

Claims 20 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tarutani, et al.* and *Okayama, et al.* as applied to claims 1, 3-5, 9, 11-14, 16-19, and 21, and in further view of U.S. Patent No. 4,907,534 to *Huang, et al.* Specifically, the Examiner states that *Tarutani, et al.* and *Okayama, et al.* disclose Applicants' invention except for a common purge gas source, assertedly described by *Huang, et al.*

Applicants respectfully traverse the rejection. As discussed above, *Tarutani, et al.* and *Okayama, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claim 1. In addition, *Huang, et al.* do not teach the elements of Applicants' invention lacking in the previously cited references. Therefore, the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claim or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

Claims 1-2, 6-7, 10, 23-25, 29, 34, 44-45, 49-51, 53-58, 60-62, 106-114, and 116 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,383,330 to *Raaijmakers* in view of U.S. Patent No. 6,143,077 to *Ikeda, et al.* The Examiner asserts that *Raaijmakers* teaches a chamber lid having a tapered surface, but not an expanding channel and one or more gas conduits comprising one or more valves coupled to one or more gas sources, wherein the gas conduits are positioned at an angle from a center of the expanding channel, which are assertedly disclosed by *Ikeda, et al.*

Applicants respectfully traverse the rejection. While *Raaijmakers* teaches a covering member containing a tapered bottom surface, *Ikeda, et al.* do not teach an expanding channel as recited in Applicants' base claims 1, 23, 34, 45, 63, 106, and 118.

Rather, the gas delivery guide 44 described by *Ikeda, et al.* is a tapered bottom surface of a chamber cover. The “channel” described by *Ikeda, et al.* is actually gas delivery port 443, having a fixed radius  $r_0$ . (Figures 1-6) Tapered opposing surface 444 extends from gas delivery port 443 to fitting part 445. (Column 7, Lines 50-60) *Ikeda, et al.* describe gas delivery guide 44 as comprising both gas delivery port 443 and opposing surface 444, however, gas delivery guide 443 is a fixed diameter channel connected to gas delivery pipe 421. (Column 7, Lines 37-39) As such, gas delivery guide 443 is a non-expanding channel coupled to the opposing surface 444, wherein the latter constitutes a covering member containing a tapered bottom surface. Thus, *Ikeda, et al.* teach a tapered surface wherein “the distance between the opposing surface 444 and the substrate 20 gradually becomes smaller on proceeding from the edge of the gas delivery port 443 to the outer edge.” (Column 7, Lines 57-60)

Furthermore, *Ikeda, et al.* do not teach one or more gas conduits positioned at an angle from a center of an expanding channel, as required by Applicants’ base claims 1, 23, 34, 45, and 63. Applicants claim an expanding channel wherein one or more gas conduits coupled thereto are positioned at an angle from a center thereof. Applicants describe the orientation of the gas conduits and the expanding channel in their specification as normal (perpendicular) to the longitudinal axis of the expanding channel or angled from greater than  $-90^\circ$  to less than  $90^\circ$  thereto. (See Applicants’ Figure 3 and paragraph [0037]) This description comports with a typical understanding of the phrase “positioned at an angle.” The gas conduit described by *Ikeda, et al.* (delivery pipe 421) is depicted as being parallel to the longitudinal axis of the channel (gas delivery port 443). (Figures 1 and 3-6) The Examiner asserts that this orientation describes an angle ( $0^\circ/360^\circ$ ) and hence falls within Applicants’ claim limitation. This reading of the claim term “positioned at an angle” departs from the standard connotation thereof. Importantly, as held in *In re Marosi*, 710 F.2d 799, 802 (Fed. Cir. 1983), “[c]laims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their broadest reasonable interpretation.” (MPEP § 2111.01) Moreover, it is “well settled that each element of a claim is material and essential.” *Lemelson v. United States*, 752 F.2d 1538, 1551 (Fed. Cir. 1985). The claim limitation “positioned at an angle” would be meaningless if it encompassed an orientation of  $0^\circ$  to

360° inclusive. Therefore, *Ikeda, et al.* does not teach, show, or suggest a gas conduit positioned at an angle from an expanding channel, as recited by Applicants. Since the cited references, alone or in combination, do not teach, show, or suggest each of the limitations of Applicants' base claims or the claims depending therefrom, the rejection is respectfully requested to be withdrawn.

Claims 8 and 59 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Raaijmakers* and *Ikeda, et al.* as applied to claims 1-2, 6-7, 10, 23-25, 29, 34, 44-45, 49-51, 53-58, 60-62, 106-114, and 116, and in further view of WIPO Patent Publication No. 97/03223 to *Nitescu, et al.* Specifically, the Examiner states that *Raaijmakers* and *Ikeda, et al.* disclose Applicants' invention except for one or more gas conduits equally spaced out around a perimeter of the expanding channel, assertedly disclosed by *Nitescu, et al.*

Applicants respectfully traverse the rejection. As discussed above, *Raaijmakers* and *Ikeda, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims 1 and 45. In addition, *Nitescu, et al.* do not teach the elements of Applicants' invention lacking in the previously cited references. Therefore, the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

Claims 26-27 and 41-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Raaijmakers* and *Ikeda, et al.* as applied to claims 1-2, 6-7, 10, 23-25, 29, 34, 44-45, 49-51, 53-58, 60-62, 106-114 and 116, and in further view of U.S. Patent No. 5,919,332 to *Koshiishi, et al.* Specifically, the Examiner states that *Raaijmakers* and *Ikeda, et al.* disclose Applicants' invention except for a choke disposed on the chamber lid adjacent a perimeter of the tapered bottom surface and having an inner diameter at least as long as a diameter of the substrate receiving surface, assertedly disclosed by *Koshiishi, et al.*

Applicants respectfully traverse the rejection. As discussed above, *Raaijmakers* and *Ikeda, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims 23 and 34. In addition, *Koshiishi, et al.* do not teach the elements of Applicants' invention lacking in the previously cited references. Therefore,

the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

Claims 115 and 117 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Raaijmakers* and *Ikeda, et al.* as applied to claims 1-2, 6-7, 10, 23-25, 29, 34, 44-45, 49-51, 53-58, 60-62, 106-114, and 116, and in further view of U.S. Patent No. 4,907,534 to *Huang, et al.* Specifically, the Examiner states that *Raaijmakers* and *Ikeda, et al.* disclose Applicants' invention except for a common purge gas source coupled to each gas conduit, assertedly disclosed by *Huang, et al.*

Applicants respectfully traverse the rejection. As discussed above, *Raaijmakers* and *Ikeda, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claim 106. In addition, *Huang, et al.* do not teach the elements of Applicants' invention lacking in the previously cited references. Therefore, the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claim or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

Claims 63-68, 71, 73, 118-126, and 128 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,383,330 to *Raaijmakers* in view of U.S. Patent No. 6,143,077 to *Ikeda, et al.* and U.S. Patent No. 5,919,332 to *Koshiishi, et al.* Specifically, the Examiner states that *Raaijmakers* and *Ikeda, et al.* disclose Applicants' invention except for a choke disposed on the chamber lid adjacent a perimeter of the tapered bottom surface, assertedly disclosed by *Koshiishi, et al.*

Applicants respectfully traverse the rejection. As discussed above, *Raaijmakers* and *Ikeda, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims 63 and 118. In addition, *Koshiishi, et al.* do not teach the elements of Applicants' invention lacking in the previously cited references. Therefore, the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

Claims 69-70 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Raaijmakers* and *Ikeda, et al.* as applied to claims 63-68, 71, 73, 118-126, and 128

above, and further in view of U.S. Patent No. 5,224,513 to *Bertone*. Specifically, the Examiner states that *Raaijmakers* and *Ikeda, et al.* disclose Applicants' invention except for one or more valves selected from the group consisting of pneumatically actuated valves and electrically actuated valves or one or more valves being zero dead volume valves, assertedly disclosed by *Bertone*.

Applicants respectfully traverse the rejection. As discussed above, *Raaijmakers* and *Ikeda, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claim 63. In addition, *Bertone* does not teach the elements of Applicants' invention lacking in the previously cited references. Therefore, the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claim or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

Claims 72, 74, 127, and 129 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Raaijmakers* and *Ikeda, et al.* as applied to claims 63-68, 71, 73, 118-126, and 128 above, and further in view of U.S. Patent No. 4,907,534 to *Huang, et al.* Specifically, the Examiner states that *Raaijmakers* and *Ikeda, et al.* disclose Applicants' invention except for a common purge gas source coupled to each gas conduit, assertedly disclosed by *Huang, et al.*

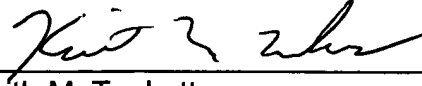
Applicants respectfully traverse the rejection. As discussed above, *Raaijmakers* and *Ikeda, et al.*, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims 63 and 118. In addition, *Huang, et al.* do not teach the elements of Applicants' invention lacking in the previously cited references. Therefore, the cited references, alone or in combination, do not teach, show, or suggest each element of Applicants' base claims or claims depending therefrom. Applicants respectfully request withdrawal of the rejection.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.



Having addressed all issues set out in the Final Office Action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

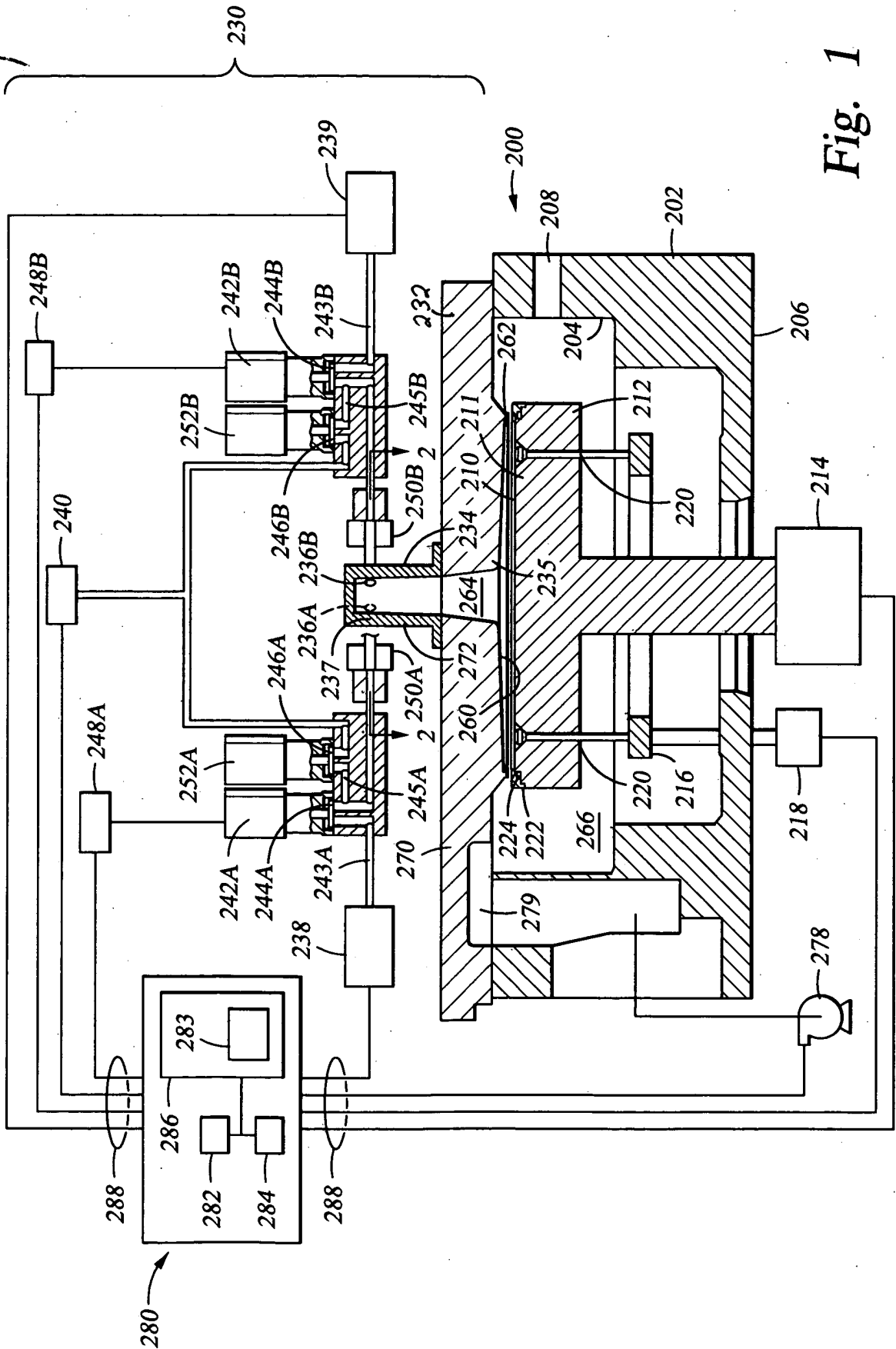


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Keith M. Tackett  
Registration No. 32,008  
MOSER, PATTERSON & SHERIDAN, L.L.P.  
3040 Post Oak Blvd. Suite 1500  
Houston, TX 77056  
Telephone: (713) 623-4844  
Facsimile: (713) 623-4846  
Attorney for Applicants



Fig. 1



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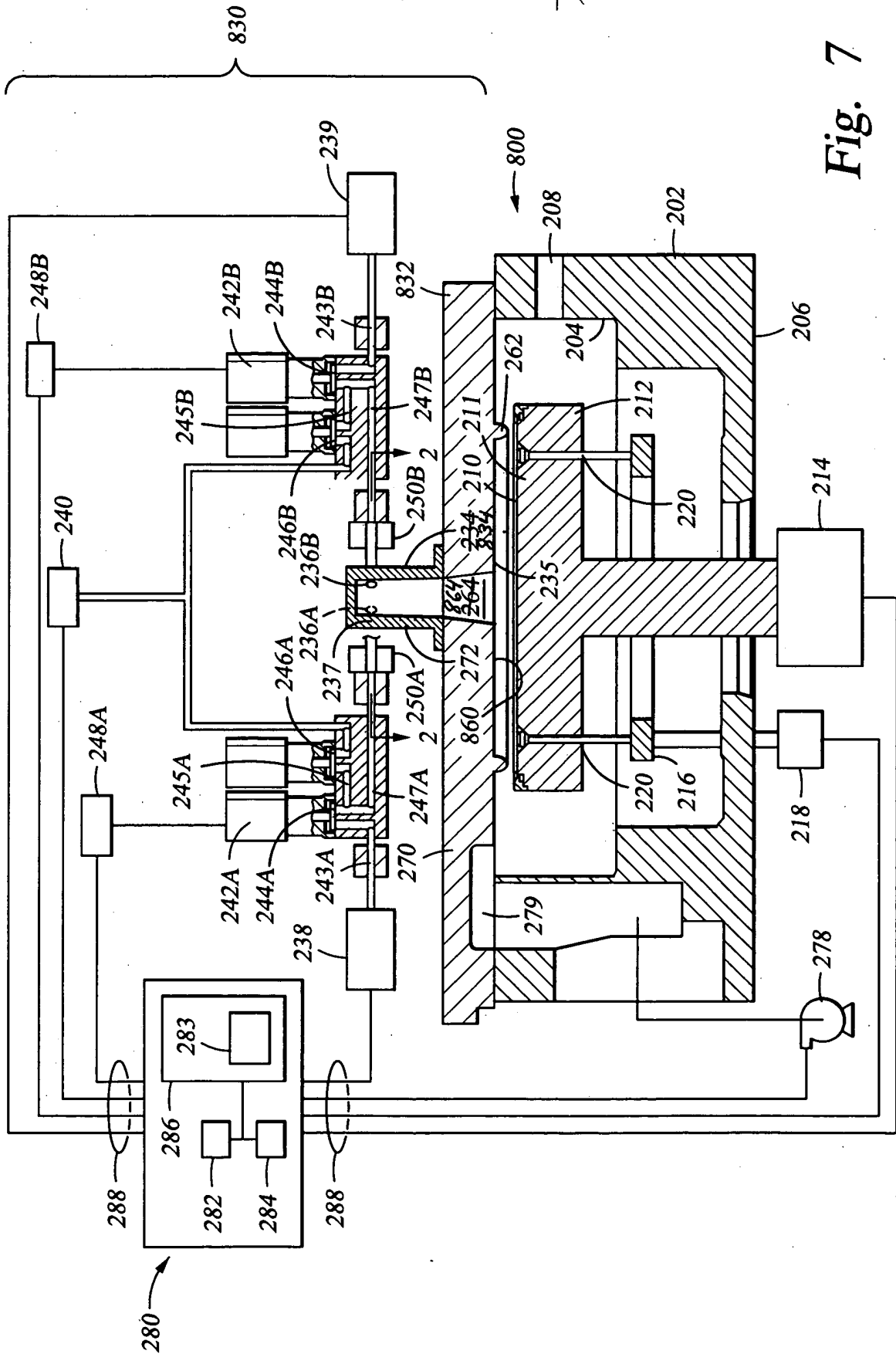


Fig. 7



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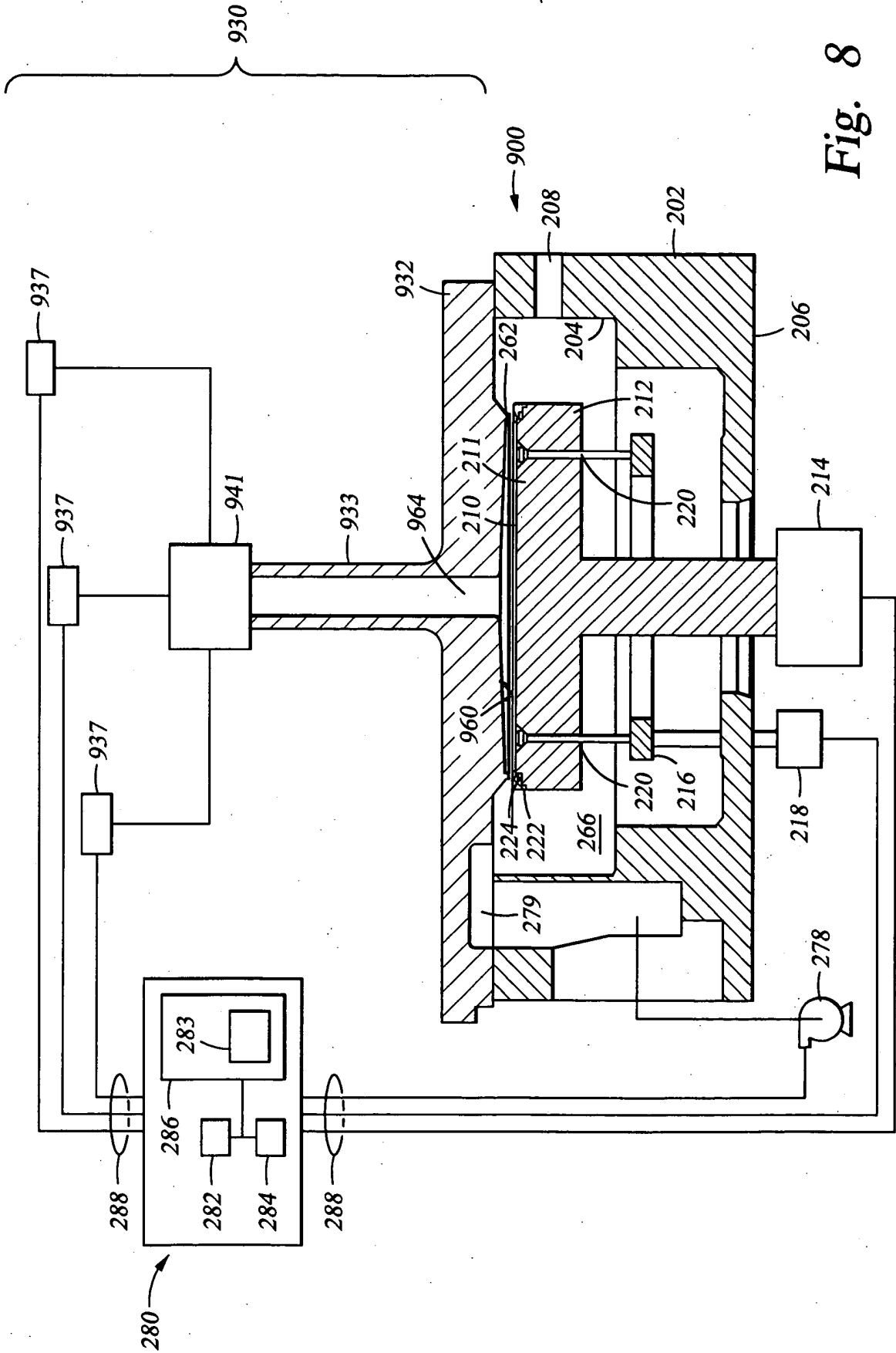


Fig. 8



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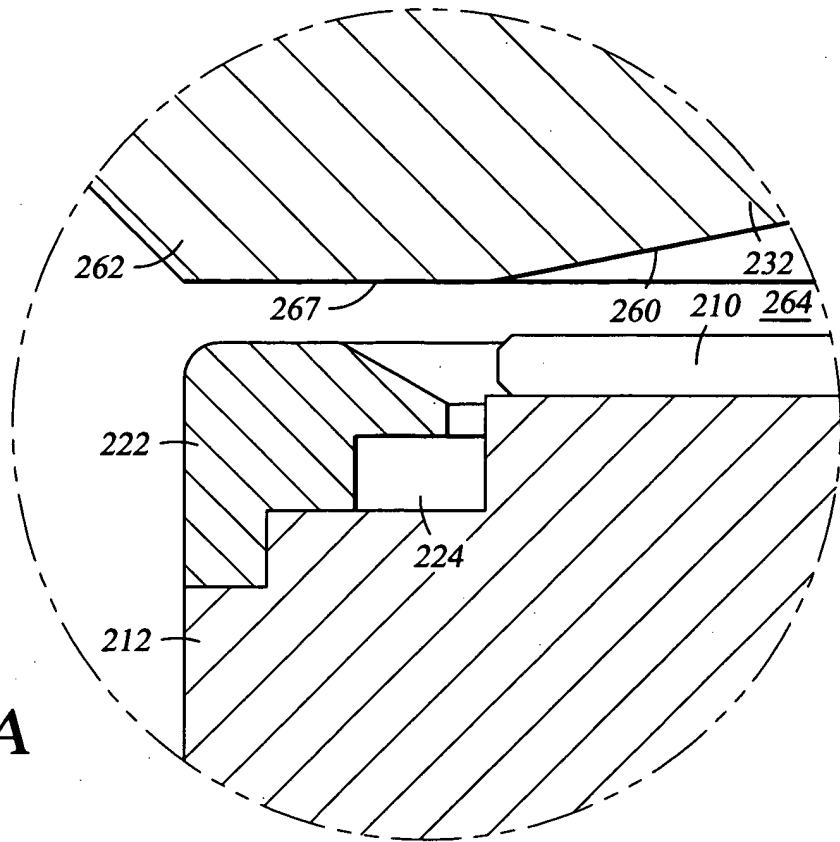


Fig. 9A

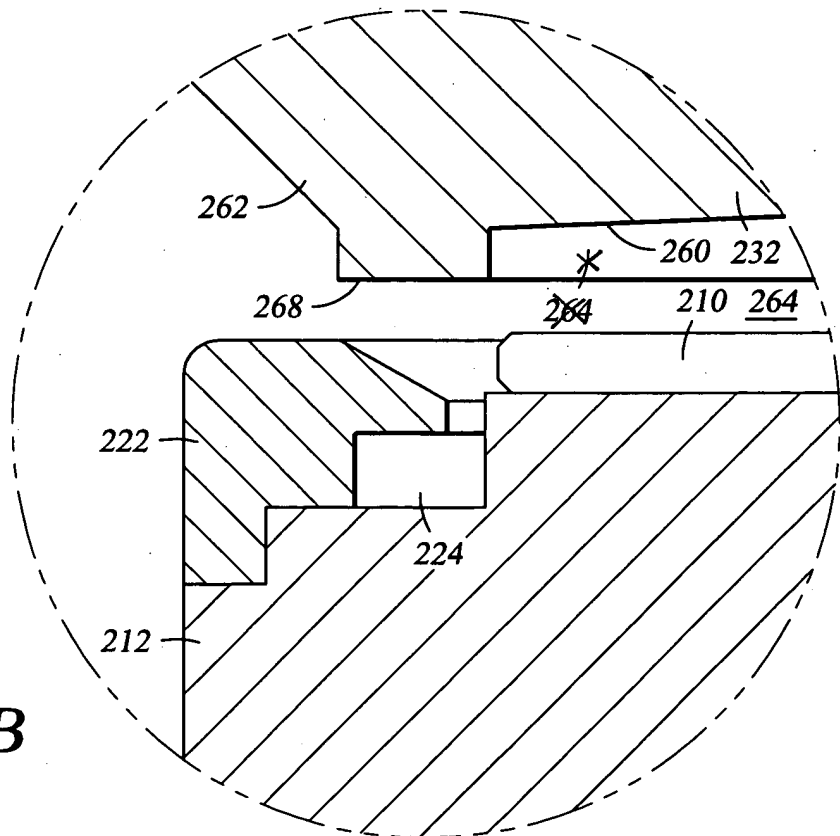


Fig. 9B